**Citation:**

White C, Kolble R, Carlson R, Lipson N. The impact of a health campaign on hand hygiene and upper respiratory illness among college students living in residence halls.. J Am Coll Health. 2005 Jan-Feb;53(4):175-81. Erratum in: J Am Coll Health. 2005 Jul-Aug;54(1):64.

**PubMed ID:** 15663066

**Study Design:**

Nonrandomized Trial

**Class:**

C - Click here for explanation of classification scheme.

**Research Design and Implementation Rating:**

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

To determine whether a campaign to increase hand hygiene practices, coupled with the introduction of an alcohol-based antibacterial gel, reinforced by messages to continue washing and sanitizing, would decrease the incidence of upper respiratory illnesses (URIs) in a residence hall population on the campus of a major western university.

**Inclusion Criteria:**

- College student living in one of 4 on-campus residence halls which had an academic emphasis or no academic emphasis, at University of Colorado, Boulder.

**Exclusion Criteria:**

- Not a college student living in one of 4 on-campus residence halls which had an academic emphasis or no academic emphasis, at University of Colorado, Boulder.

**Description of Study Protocol:**

**Recruitment**

- Students recruited from four on-campus residence halls (with students typical of those in on-campus residence halls) with hall directors willing to assist with the study.
- Participants recruited through e-mails and fliers distributed to residents of the selected residence halls which explained the nature of the study and listed the incentives for participation.
- Enrollment was entirely voluntary; students could discontinue participation at any time.
- During enrollment, students completed consent forms describing the nature of the study and were assigned a confidential number to use on every response which allowed them to access

the Web-based survey each week.
- Participants were given $5 for each survey completed, $5 for enrolling, and $20 extra if all 8 surveys were completed; maximum of $65 for perfect reporting. Monetary incentives were provided at the midpoint and at the end of the study.
- Participants received weekly e-mail reminders about study and nonmonetary incentives (such as pizza coupons) designed to encourage continued participation.

**Design**

- Residence halls involved in the study were matched on an academic emphasis:
- - Two included academic programs as part of learning environment – one was assigned to the experimental group; the other to the control group;
  - Two other halls had no special emphasis – one was assigned to the experimental group; the other to the control group.
- In an experimental-control group design, participants in the experimental residence halls were:
  - exposed to a health campaign to increase awareness of the importance of hand washing and hand cleanliness in avoiding colds and the flu;
  - received free Purell hand sanitizer in their rooms and in travel packs, and
  - had access to gel hand sanitizer in the dormitory bathrooms and hall dining room.
- Participants in the control residence halls were told they were participating in a study to examine wellness behaviors and their links to illness.
- All participants completed:
  - pre- and post-study surveys regarding knowledge, attitudes, and behaviors related to various health practices; and
  - weekly reports of their experience of cold or flu symptoms (for each symptom, subject indicated whether they had experienced the symptom in the previous week and, if so, how long it had lasted), use of tobacco and exercise habits, hand washing and use of gel sanitizers (i.e., frequency and timing of use), weekly for eight weeks.
- Study was conducted in September, October, and November.

**Dietary Intake/Dietary Assessment Methodology:** Not applicable

**Blinding used:** No blinding was used.

**Intervention:**

Intervention involved exposing experimental group to:

- a health campaign to increase awareness of the importance of hand washing and hand cleanliness in avoiding colds and the flu; campaign included:
  - bulletin board messages in hall corridors and outside dining halls,
  - flier messages in bathroom stalls which were changed weekly;
  - messages progressed from attention getting to knowledge, benefits, and persuasion (first 4 weekly messages in restrooms focused on the benefits of hand washing, using hand sanitizers, and increasing awareness of positive effects of those behaviors; the second 4 weekly messages focussed on persuading subjects to continue sanitizer use and hand washing);
- free Purell hand sanitizer in their rooms and in travel packs, and
- gel hand sanitizer in the dormitory bathrooms and hall dining room.

**Statistical Analysis**

- Calculated average washing score and average sanitizer scores based on the average number of times since waking that particular day that subjects reported washing or using sanitizer; a ratio of washings or sanitizer use per hour was created by dividing the above scores by the number of hours the subject had been awake that day)
- Used repeated measures analysis of variance (ANOVA) to assess changes in knowledge attitudes and perceived behavior
- Likert scale used to assess attitudes toward hand hygiene (the scale achieved adequate reliability (Cronbach's α =.70); same scale used to assess attitudes toward gel sanitizer with 4 times that were reliable (Cronbach's α =.70); and assessed hand-washing behavior, this scale had an overall reliability of .79 (Cronbach's α);
- Used Rogers' innovation-diffusion theory as a guide in developing health messages.

**Data Collection Summary:**

**Timing of Measurements**

- pre- and post-study surveys regarding knowledge, attitudes, and behaviors related to various health practices; and
- weekly reports of their experience of cold or flu symptoms, use of tobacco and exercise habits, hand washing and use of gel sanitizers for eight weeks.

**Dependent Variables**

- Knowledge, attitudes, perceived behavior about hand hygiene, handwashing, the health benefit of using hand sanitizer (measured using pre- and post-study surveys)
- Average frequency of hand washing or anitbacterial gel hand sanitizer use (measured using a self-reported weekly survey instrument)
- Upper respiratory illness (URI) rates (measured using a self-reported weekly survey that inquired about presence and duration of 8 URI symptoms: sore throat, stuffy or runny nose, ear pain, painful or swollen neck, chest cough, chest congestion, sinus pressure, pain, and fever)
- Absenteeism (measured using a self-reported weekly survey that inquired about whether thy had missed at least 1 day of school or work because of illness)
- Awareness and perceptions about message campaign (measured using message recall surveys just to the experimental group at the midpoint and end of the study that inquired about if and where hand hygiene messages were seen,the nature of the most memorable message, message impact, and if they had discussed hand hygiene with other hall residents)

**Independent Variables**

- health campaign bulletin board messages in hall corridors and outside dining halls,
- health campaign flier messages in bathroom stalls which were changed weekly,
- free Purell hand sanitizer in subjects' rooms and in travel packs,
- gel hand sanitizer in the dormitory bathrooms and hall dining room.

(messages progressed from attention getting to knowledge, benefits, and persuasion (first 4 weekly messages in restrooms focused on the benefits of hand washing, using hand sanitizers, and increasing awareness of positive effects of those behaviors; the second 4 weekly messages focussed on persuading subjects to continue sanitizer use and hand washing)

**Control Variables:** not reported

## Description of Actual Data Sample:

**Initial N**: 430 students initially enrolled (not all completed each portion of study)

100 students were recruited from each of 4 residence halls (each housing 300-400 students) for a total of ~ 400 participants (sample of this size provided a good estimation of student behavior in each hall and was large enough to detect moderate effects in comparing the experimental and control groups).

**Attrition (final N):**

391 students met criteria for inclusion in analyses (188 in experimental condition,; 203 in control condition); to be included in the data analyses, participants had to complete the prestudy measures and 3 weekly reports of illness behavior.

**Age**: 85.6% college freshman (No specific ages provided)

**Ethnicity**:

- 88% White
- 1.7% African American
- 4.2% Hispanic or Latino
- 2.8% Asian or Pacific Islander
- 0.3% Native or Alaskan American
- 3% not reported

**Other relevant demographics**: Authors reported no significant demographic differences between experimental and control group subjects, no differences in reported experience of seasonal allergies or smoking behavior between those groups; and similar living arrangements in each residence hall (although the average number of roommates for experimental subject was 1 and 0.87 for controls, authors did not think this was important)

**Anthropometrics:** No data provided on other relevant demographics of participants.

**Location**: Colorado, USA

## Summary of Results:

**Key Findings:**

Based on weekly report data:

- The experimental group had significantly better hand hygiene than control group reflecting a difference in hand-washing behavior [$t(330) = 2.06$, $p < .02$], and in hand-sanitizer use [$t(367) = 12.92$, $p < .0001$]
- The experimental group reported 26% fewer illnesses than control group (illness rate for experimental group was 20.2% versus 27.5% in control group across the study, $\chi 2 = 19.97$, $p < .0001$) (students were identified as experiencing URI when reported 2 or more URI symptoms lasting 2-3 days).
- Women washed their hands more frequently than men [(.49 vs .40), $F(1, 295) = 11.60$, $p < .001$], but did not differ significantly in use of gel hand sanitizer.

**Other Findings:**

Based on pre/poststudy reports of knowledge, attitudes, and perceived behavior:

- Knowledge about hand hygiene increased in the experimental but not control group [$F(1, 334) = 11.25$, $p < .001$]; and attitudes toward hand washing increased over time in both groups [$F(1, 342) = 19.76$, $p < .001$].

- Participants' perceived hand-hygiene behavior (perceived frequency of washing hands before eating) - main effect for time [$F(1, 325) = 21.14$, $p < .0001$, $\eta^2 = .06$, with perceived hand-washing increased from pre- to poststudy in both conditions.

Based on weekly report data:

- Significantly more control group subjects reported missing at least 1 day of school or work because of illness (9.5%) compared with the product-use group (5.7%, $\chi 2 = 13.39$, $p < .0001$) which reflects 40% fewer absences in the experimental versus the control group.

Based on message recall surveys:

- 76% of experimental group subjects indicated that they encountered a message in their residence hall about handwashing,
- 96% of students had encountered messages in bathrooms,
- Bulletin board messages on residence hall floors and common areas were seen by many students (56% and 54%, respectively) but not as often as those in bathrooms,
- 32% of respondents had talked about hand washing with someone in their residence hall during the last month.

## Author Conclusion:

- Students in the experimental condition who received the message campaign and gel sanitizer:
  - washed their hands and used gel sanitizer more often than those in the control group,
  - experienced fewer URIs and missed fewer classes and work as a result of URIs,
  - increased their knowledge about the nature of hand hygiene and the spread of URI from the pre- to post-study assessments.
- Positive attitudes toward hand washing and sanitizer use increased during the study for control and experimental groups because:
  - attitudes were relatively positive to begin with (approaching 4 on a 5-point scale), suggesting a ceiling effect that allowed little room for attitude change,
  - questions in the prestudy survey and the weekly survey, although mixed with many other health behavior items, led students to think more positively about hand hygiene,

## *Reviewer Comments:*

*Partially funded by inventors of Purell, hand sanitizer*

*Authors noted the following study limitations:*

- *It was not possible to determine whether the message campaign or sanitizer alone would influence illness.*
- *Use of self-report data – illness was not verified by medical examination; thus, some students who experienced symptoms may have been classified as having an illness when they were not ill.*
- *Lack of baseline rates of illness in each residence hall did not allow for the determination of whether differences in illness may have resulted from the overall illness rate in each hall.*
- *Likelihood of contracting a URI is influenced by a number of health behaviors and may not just be due to careful hand hygiene which can help students avoid URIs. While no differences in smoking or allergy rates were found between experimental and control groups, smoking slightly increased the occurrence of URI in both groups.*

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***Research Design and Implementation Criteria Checklist: Primary Research***

## Relevance Questions

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| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | Yes |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about? | Yes |
| 3. | Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice? | Yes |
| 4. | Is the intervention or procedure feasible? (NA for some epidemiological studies) | Yes |

**Validity Questions**

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| **1.** | **Was the research question clearly stated?** | Yes |
| 1.1. | Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified? | Yes |
| 1.2. | Was (were) the outcome(s) [dependent variable(s)] clearly indicated? | Yes |
| 1.3. | Were the target population and setting specified? | Yes |
| **2.** | **Was the selection of study subjects/patients free from bias?** | ??? |
| 2.1. | Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study? | Yes |
| 2.2. | Were criteria applied equally to all study groups? | Yes |
| 2.3. | Were health, demographics, and other characteristics of subjects described? | No |
| 2.4. | Were the subjects/patients a representative sample of the relevant population? | Yes |
| **3.** | **Were study groups comparable?** | Yes |
| 3.1. | Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT) | Yes |
| 3.2. | Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline? | Yes |
| 3.3. | Were concurrent controls used? (Concurrent preferred over historical controls.) | Yes |
| 3.4. | If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis? | Yes |

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| 3.5. | If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.) | Yes |
| 3.6. | If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")? | N/A |
| **4.** | **Was method of handling withdrawals described?** | ??? |
| 4.1. | Were follow-up methods described and the same for all groups? | Yes |
| 4.2. | Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.) | No |
| 4.3. | Were all enrolled subjects/patients (in the original sample) accounted for? | ??? |
| 4.4. | Were reasons for withdrawals similar across groups? | N/A |
| 4.5. | If diagnostic test, was decision to perform reference test not dependent on results of test under study? | N/A |
| **5.** | **Was blinding used to prevent introduction of bias?** | No |
| 5.1. | In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate? | No |
| 5.2. | Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.) | No |
| 5.3. | In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded? | No |
| 5.4. | In case control study, was case definition explicit and case ascertainment not influenced by exposure status? | N/A |
| 5.5. | In diagnostic study, were test results blinded to patient history and other test results? | N/A |
| **6.** | **Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?** | Yes |
| 6.1. | In RCT or other intervention trial, were protocols described for all regimens studied? | Yes |
| 6.2. | In observational study, were interventions, study settings, and clinicians/provider described? | Yes |
| 6.3. | Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect? | Yes |
| 6.4. | Was the amount of exposure and, if relevant, subject/patient compliance measured? | ??? |

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| 6.5. | Were co-interventions (e.g., ancillary treatments, other therapies) described? | Yes |
| 6.6. | Were extra or unplanned treatments described? | N/A |
| 6.7. | Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups? | ??? |
| 6.8. | In diagnostic study, were details of test administration and replication sufficient? | N/A |
| **7.** | **Were outcomes clearly defined and the measurements valid and reliable?** | Yes |
| 7.1. | Were primary and secondary endpoints described and relevant to the question? | Yes |
| 7.2. | Were nutrition measures appropriate to question and outcomes of concern? | N/A |
| 7.3. | Was the period of follow-up long enough for important outcome(s) to occur? | Yes |
| 7.4. | Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures? | Yes |
| 7.5. | Was the measurement of effect at an appropriate level of precision? | Yes |
| 7.6. | Were other factors accounted for (measured) that could affect outcomes? | No |
| 7.7. | Were the measurements conducted consistently across groups? | Yes |
| **8.** | **Was the statistical analysis appropriate for the study design and type of outcome indicators?** | Yes |
| 8.1. | Were statistical analyses adequately described and the results reported appropriately? | Yes |
| 8.2. | Were correct statistical tests used and assumptions of test not violated? | Yes |
| 8.3. | Were statistics reported with levels of significance and/or confidence intervals? | Yes |
| 8.4. | Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)? | ??? |
| 8.5. | Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)? | ??? |
| 8.6. | Was clinical significance as well as statistical significance reported? | Yes |
| 8.7. | If negative findings, was a power calculation reported to address type 2 error? | N/A |
| **9.** | **Are conclusions supported by results with biases and limitations taken into consideration?** | Yes |
| 9.1. | Is there a discussion of findings? | Yes |

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| | 9.2. | Are biases and study limitations identified and discussed? | Yes |
| **10.** | **Is bias due to study's funding or sponsorship unlikely?** | | No |
| | 10.1. | Were sources of funding and investigators' affiliations described? | Yes |
| | 10.2. | Was the study free from apparent conflict of interest? | No |